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EXAMINER	
PHAM, HUNG Q	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/724,897	CHANG ET AL.	
	Examiner	Art Unit	
	HUNG Q. PHAM	2168	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-19,21-31 and 33-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-19,21-31,33-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/03/07 has been entered.

Response to Arguments

Applicant's arguments with respect to the rejection under 35 U.S.C. § 102 have been fully considered but they are not persuasive.

As argued by applicant at page 9:

> Applicants' comments in the Request for Reconsideration Under 37 CFR §1.116, filed on July 3, 2007, are still considered as valid and the Examiner is requested to make of record the locations of the cited references that demonstrate the existence of semantic objects for which attributes exist that can be summarized and indexed. Clearly, if there is no extraction of semantic objects in a cited reference, then there are no attributes to be summarized/indexed.

As argued by applicant in the Request for Reconsideration filed on 07/03/2007:

> Applicants submit that Bergman fails to satisfy the plain meaning of the claim language of the independent claims relative to a "semantic object." Indeed, Bergman even concedes that the capability of determining semantic objects has *not even been incorporated*, as clearly described at lines 22-25 on page 457: "*Semantic object extraction. Semantic object extraction (as part of data ingest) has not been incorporated into the current scenario. Since the SPIRE framework supports object pre-extraction, however, we will describe this facility here. Incorporating this into the PetroSPIRE application, would be very straightforward, and we anticipate doing so in the near future.*"
>
> Applicants, therefore, submit that, if the capability to extract semantic objects is not even present in Bergman, then this reference clearly fails to suggest the summarization and indexing of semantic objects, as required by the independent claims.

> In the rejection, the Examiner relies upon the description at the bottom of page 457 related to "Feature Extraction." However, feature extraction is not equivalent to "semantic object extraction", as clearly evidenced by the description in Bergman itself that feature extraction has been implemented in their system, as described in this final paragraph on page 457, whereas the capability of semantic object extraction has not been incorporated into their system. Therefore, Bergman itself considers feature extraction to be something other than extraction of semantic objects.
>
> Hence, turning to the clear language of the claims, in Bergman there is no teaching or suggestion of: "A method for storing a semantic object derived from geological seismic survey data, the method comprising: summarizing attributes of said semantic object; indexing the summary of attributes; and storing the summary of attributes and the index of the summary of attributes, wherein said summary of attributes comprises one of a slice label, a signal strength, and a coordinate of a surveyed segment", as required by independent claim 1. The remaining

The examiner respectfully disagrees.

As disclosed by Bergman, data are collected from an oil well (Bergman, Page 450 Lines 5-6). Well data are used for identifying semantic object, e.g., sandstone or shale strata (Bergman, Page 450 Lines 15-20). In PetroSPIRE, the set of object definitions is created by a domain expert (Bergman, Page 457 Lines 27-28). As shown in FIG. 4(a), a shale strata is defined by summarizing attributes of shale strata, e.g., FMI Texture and Gamma Ray > 45. Texture and the value are indexed (Bergman, Page 457 Lines 43-44 and 50-51). The data repository for SPIRE includes a relational database for storing derived features and semantic object (Bergman, Page 453 Lines 14-15).

The teaching of Bergman as discussed indicates the steps of:

summarizing attributes of said semantic object, e.g., as in FIG. 4(a) attributes such as FMI Texture and Gamma Ray of semantic object shale strata is summarized;

indexing the summary of attributes, e.g., texture and value are indexed as taught by Bergman at Page 457 Lines 43-44 and 50-51;

storing the summary of attributes and the index of the summary of attributes, e.g., the defined semantic object such as shale strata and the index is stored in a relational database as taught by Bergman at Page 453 Lines 14-15.

As further disclosed by Bergman at Page 457 Lines 27-29, the object definition can be used to pre-extract semantic object.

The missing of Bergman is *geological seismic survey data* for extracting semantic object.

However, as taught by Bergman at Page 457 Lines 32-42, SPIRE implements the Li's algorithm for selecting texture features. As taught by Li at Page 2, in petroleum exploration, other than core images, seismic data or *geological seismic survey data* is used for extracting texture features.

By incorporating Li's technique in SPIRE, obviously *geological seismic survey data*, e.g., seismic data, can be used to generate texture features and used the texture features for extracting semantic object.

In light of the foregoing arguments, the 35 U.S.C. § 102 and 103 is hereby sustained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 8, 9, 12-19, 21, 22, 25-31, 33, 34, 37 and 38 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious

over Bergman et al. [PetroSPIRE: A multi-modal content-based retrieval system for petroleum applications] and Li et al. [Comparing Texture Feature Sets for Retrieving Core Images in Petroleum Application].

Regarding claims 1, 13, 14 and 26, Bergman teaches ***a method for storing a semantic object*** (Bergman, Abstract), the method comprising:

summarizing attributes of said semantic object (As in FIG. 4(a) attributes such as FMI Texture and Gamma Ray of semantic object shale strata is summarized);

indexing the summary of attributes (Texture and the value are indexed (Bergman, Page 457 Lines 43-44 and 50-51)); and

storing the summary of attributes and the index of the summary of attributes (The data repository for SPIRE includes a relational database for storing derived features and semantic object (Bergman, Page 453 Lines 14-15)), ***wherein said summary of attributes comprises one of a slice label, a signal strength, and a coordinate of a surveyed segment*** (As in FIG. 4(a) the Gamma Ray as *a signal strength*).

The missing of Bergman is ***geological seismic survey data*** for deriving semantic object.

However, as taught by Bergman at Page 457 Lines 32-42, SPIRE implements the Li's algorithm for selecting texture features. As taught by Li at Page 2, in petroleum exploration, other than core images, seismic data or ***geological seismic survey data*** is used for extracting texture features.

By incorporating Li's technique in SPIRE, ***geological seismic survey data***, e.g., seismic data, is an inherited feature for generating texture features.

Regarding claim 1, 13, 14 and 26, Bergman teaches ***a method for storing a semantic object*** (see Abstract), the method comprising:

summarizing attributes of said semantic object (As in FIG. 4(a) attributes such as FMI Texture and Gamma Ray of semantic object shale strata is summarized);

indexing the summary of attributes (Texture and the value are indexed (Bergman, Page 457 Lines 43-44 and 50-51)); and

storing the summary of attributes and the index of the summary of attributes (The data repository for SPIRE includes a relational database for storing derived features and semantic object (Bergman, Page 453 Lines 14-15)), ***wherein said summary of attributes comprises one of a slice label, a signal strength, and a coordinate of a surveyed segment*** (As in FIG. 4(a) the Gamma Ray as *a signal strength*).

The missing of Bergman is ***geological seismic survey data*** for deriving semantic object.

However, as taught by Bergman at Page 457 Lines 32-42, SPIRE implements the Li's algorithm for selecting texture features. As taught by Li at Page 2, in petroleum exploration, other than core images, seismic data or ***geological seismic survey data*** is used for extracting texture features.

By incorporating Li's technique in SPIRE, obviously ***geological seismic survey data***, e.g., seismic data, is used to generate texture features.

Regarding claims 2, 15, and 27, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 1, 14 and 26, Bergman further discloses ***the semantic object comprises a summary representation of raw data measurements*** (Bergman, Page 454 Lines 11-12, indicating that features are extracted from raw data).

Regarding claims 3, 16, and 28, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 1, 14 and 26, Bergman further discloses the step of ***searching a database of a plurality of indexed attributes of semantic objects*** (Bergman, Page 459 Lines 33 and 41, querying a database which includes an index of texture features).

Regarding claims 4, 17, and 29, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 3, 16 and 26, Bergman further discloses the step of ***searching the index of the plurality of semantic object attributes to identify a semantic object having attributes that match a query and retrieving the identified semantic object*** (Bergman, Page 452 Lines 18-20, using a semantic definition to search the archive, and subsequently returning the results).

Regarding claims 5, 18, and 30, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 3, 16 and 28, Bergman further discloses ***an optimizing mechanism is used in searching to optimize the process of searching*** (Bergman, Page 459 Lines 7-10, indicating a dimensionality reduction algorithm that locally reduces the dimensionality of the search space. Lines 5-6 indicate that the search process can be extremely time-consuming if a linear scan is performed, hence, the dimensionality reduction algorithm is presented as a time-saving optimization to the search process).

Regarding claims 6, 19, and 31, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 1, 14 and 26, Bergman further discloses ***the semantic object represents a model of a phenomena of interest that is measured by a collection of data which exceeds a data size that is accessible with a predetermined efficiency by multiple simultaneous users*** (Bergman, Page 449 Lines 27 and 35, indicating that the semantic objects represent phenomena related to petroleum well-bore data, and that the volume of this data is extremely large).

Regarding claim claims 8, 21, and 33, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 1, 14 and 26, Bergman further discloses ***the index of the summary of attributes comprises a plurality of key features that have been resolved into a set of data points and summary statistics*** (Bergman, Page 457 Lines 50-51, where summary statistics is read on feature values, because both consist of values summarized from a semantic object).

Regarding claim claims 9, 22, and 34, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 1, 14 and 26, Bergman further discloses ***the summary of attributes comprises one of a confidence level, summary statistics and a compact approximation*** (Bergman, Page 457 Lines 46-47, where summary statistics is read on vector of feature values, because both consist of values summarized from a semantic object).

Regarding claims 12, 25, and 37, Bergman teaches all of the claimed subject matter as discussed above with respect to claims 9, 22 and 34, Bergman further discloses ***the confidence level represents a degree of accuracy of classification for the semantic object*** (Bergman, Page 458 Lines 12-14, indicating a similarity of zero or one between objects, zero indicating that the objects do not belong to the same class, one indicating that the objects do belong to the same class).

Regarding claim 38, Bergman teaches all of the claimed subject matter as discussed above with respect to claim 1, Bergman further discloses ***the semantic object has been previously extracted*** (As disclosed by Bergman at Page 457 Lines 27-29, the object definition can be used to pre-extract semantic object).

The missing of Bergman is ***geological seismic survey data*** for extracting semantic object.

However, as taught by Bergman at Page 457 Lines 32-42, SPIRE implements the Li's algorithm for selecting texture features. As taught by Li at Page 2, in petroleum exploration, other than core images, seismic data or ***geological seismic survey data*** is used for extracting texture features.

By incorporating Li's technique in SPIRE, obviously ***geological seismic survey data***, e.g., seismic data, can be used to generate texture features and used the texture features for extracting semantic object.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10, 11, 23, 24, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman et al. [PetroSPIRE: A multi-modal content-based retrieval system for petroleum applications] and Li et al. [Comparing Texture Feature Sets for

Retrieving Core Images in Petroleum Application] in view of Yu et al. [A Framework for Mining Sequence Database at Multiple Abstraction Levels].

Regarding claims 10, 23, and 35, Bergman does not explicitly teach ***the compact approximation comprises a multiple segment polyline***.

Yu teaches ***the compact approximation comprises a multiple segment polyline*** (Yu, Page 268 Col. 1 Lines 1-8, segmenting data, then finding a linear approximation to each segment. These line segments comprise a polyline, since a polyline is simply a line comprised of one or more line segments (see Wikipedia definition of polyline included in this Office Action)).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have modified the method of summarizing a semantic object taught by Bergman by the method of approximating data by a polyline taught by Yu, because approximating a semantic object by a polyline enables similarity searches, particularly to identify data with similar geological features (Yu, Page 267, Col. 1 Lines 6-11 and Col. 2 Lines 4-6).

Regarding claims 11, 24, and 36, Yu further discloses ***each segment of the multiple segment polyline comprises a best fit line having end point coordinates and a slope*** (Yu, Page 270 Col. 1 Lines 22-25, showing the segments have endpoints; Page 270 Col. 1 Lines 41-43, showing the segments have a slope).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q. PHAM whose telephone number is 571-272-4040. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, TIM T. VO can be reached on 571-272-3642. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

H. P. Pham

HUNG Q PHAM
Primary Examiner
Art Unit 2168

September 26, 2007